England. He says "that in the eastern United States and Canada there are two distinct species of lady ferns, neither of which is conspecific with *A. Filix-femina* (L.) Roth, of Europe."[4] If, therefore, *A. Filix-femina* is not a native New England species, and if these crested plants found growing so abundantly at West Rock Park are true European *A. Filix-femina*, it follows that they were planted there.

This then seems to be the answer to the riddle: that, strange as it may seem, this dwarf crested form of lady fern, found well established in such abundance at West Rock Park, has not originated there naturally from spores but has been introduced by the city authorities as a definite part of the planting scheme, and shows every indication at present of maintaining itself indefinitely.

WEST ROXBURY, MASS.

Notes on American Ferns—XII[1]

WILLIAM R. MAXON

THE SYSTEMATIC POSITION OF PELLAEA DENSA.—Under the name *Onychium densum* and on the basis of very scant material from the Rogue River region of southwestern Oregon, Brackenridge described, in 1854, the peculiar but now well known fern usually called *Pellaea densa*. It has been placed under Cryptogramma by Diels, but in every essential character this latest reference is unsatisfactory. Actually the plant is of very close relationship to *Cheilanthes californica*, despite D. C. Eaton's comment concerning the latter species that "there is no other North American fern which it resembles even slightly."[2] At first sight the

[4] l. c. p. 179.

[1] Published with the permission of the Secretary of the Smithsonian Institution.

[2] Ferns N. Amer. **1**: 46. 1878.

continuous, linear indusium, common to the very numerous contiguous sori associated in a narrow, intramarginal line, would seem to offer sharp distinctions to the soriation of *C. californica,* in which the sori are almost invariably solitary, having each a separate, short, roundish-lunate indusium attached at the transversely enlarged vein-tip to a slender, almost saccate marginal tooth on either side; but it will be found that the modification of leaf margin is similar in both species, and that the greater prominence of the marginal teeth in *C. californica* and the development of solitary sori in this species are characters directly correlated with the greater dissection of the lamina. The fronds of *Pellaea densa* are nearly always completely fertile, with long, subentire, linear segments; but in the rare semi-fertile fronds (these having serrate segments) or even in occasional wholly fertile specimens with unusually short segments the sori may be interruptedly continuous, with the indusia lobed, correspondingly, or even discontinuous. Some such specimens have actually been determined as *C. californica.* In habit, rhizome scales, absence of paleaceous or hairy covering of lamina, and development of a true membranous indusium the two species are strikingly alike and are undoubtedly congeneric. Their proper generic reference is not so clear, however. In the characters just enumerated they are at variance with a majority of the species of Cheilanthes, as that genus is now regarded, yet there are several species variously referred to either Cheilanthes or Pellaea to which they are closely akin, the whole assemblage perhaps constituting a separate genus. Thus, *Cheilanthes californica,* the type of Nuttall's unpublished genus Aspidotis, is closely similar to the African *C. Schimperi* Kunze, and *Pellaea densa* is no less closely related to the Himalayan *Cheilanthes nitidula* Hook. and the Mexican and Central American *C. intra-*

marginalis Kaulf. The last-mentioned plant is the type and sole species of Mildella, a genus proposed by Trevisan,[3] reduced to Pellaea by Christensen. If Mildella were to be recognized as distinct it should probably include (besides those mentioned above) a few tropical species, for example, the group of *C. marginata*. Pending a critical review of the whole group it seems preferable, however, to regard Mildella as a subgenus of Cheilanthes. This requires the transfer of *Pellaea densa* to Cheilanthes and, unfortunately, the assignment of a new species name, because of the earlier *Cheilanthes densa* Fée, 1852. The plant may be known, therefore, as **Cheilanthes siliquosa**, in allusion to the silique-like form of the narrowly elongate segments. The synonymy is given below.[4]

Cheilanthes pyramidalis arizonica Maxon, subsp. nov.—Rhizome oblique or short-decumbent, coarsely radicose, freely paleaceous upon and among the bases of the crowded stipes; scales ascending, linear-attenuate, 4–5 mm. long, about 0.5 mm. broad at the base, dark castaneous, opaque, nearly concolorous, rigid, the acicular apices fragile, subentire. Fronds several, fasciculate, 15–28 cm. long; stipes 8–17 cm. long, fragile, lightly flexuous, castaneous, naked above the base; lamina deltoid-ovate, subpentagonal, 7–13 cm. long, 4–10 cm. broad, subquadripinnate, all the rachises but the glossy castaneous basal parts of the primary and larger secondary ones very narrowly greenish-marginate; pinnae laxly ascending or the basal ones projected forward,

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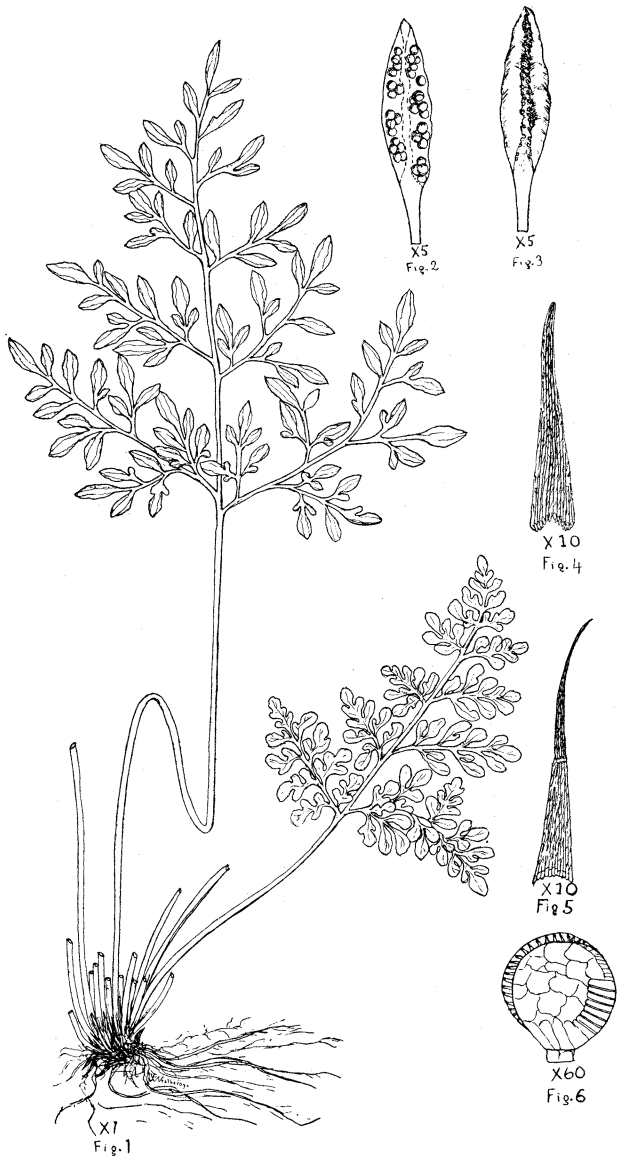
[3] Rend. Ist. Lombardo II. **9**: 810. 1876.

[4] **Cheilanthes siliquosa** Maxon, nom. nov.
Onychium densum Brack. in Wilkes, U. S. Explor. Exped. **16**: 120. *pl. 13. f. 2.* 1854.
Pellaea densa Hook. Sp. Fil. **2**: 150. *pl. 125.B.* 1858.
Allosorus densus Kuntze, Rev. Gen. Pl. **2**: 806. 1891.
Cryptogramma densa Diels in Engl. & Prantl, Nat. Pflanzenfam. **1⁴**: 280. 1899.

all the divisions and segments oblique, distant; segments mostly fertile, 3–7 mm. long, narrowly elliptical, pointed-elliptical, or oblanceolate (rarely linear), narrowly cuneate, their bases as broad as the greenish-marginate ultimate rachises; sori intramarginal, borne upon the swollen, nearly punctiform vein-tips, few-sporangiate, adjacent, confluent, not extending to the base of the segment, with a common proper indusium formed of the broadly reflexed. delicately membranous margin, the vein-tips evident without in the sinuses of shallow crenations at the base; indusia ample, often meeting at the middle of the segment, not decurrent upon the rachises, translucent, the margin delicately glandular-papillose or papillose-denticulate. Leaf tissue delicately membranous, sometimes minutely granular-crustaceous near the vein-tips above and on the lower part of the indusium, beneath beset with numerous, oblique or appressed, very minute glandular hairs, these usually wine-colored and appearing resinous.

Type in the U. S. National Herbarium, No. 692694, collected on the steep moist slopes of Ramsey Canyon, Huachuca Mountains, southeastern Arizona, August 28, 1912, by L. N. Goodding (No. 1327). Represented also by other specimens collected at the same place by Professor Goodding (No. 760) and by specimens collected in August, 1882, in Conservatory Canyon, of the same mountains, by Lemmon, all distributed as *Pellaea marginata*, a South American species which barely reaches North America. While amply distinct from typical Mexican *C. pyramidalis*, the Arizona plant seems, nevertheless, to intergrade imperceptibly with larger but similarly decompound Mexican forms of more robust and upright habit through specimens collected in Chihuahua (*Palmer* 446; *Pringle* 1442), these necessitating its recognition as a subspecies merely. *Cheilanthes pyramidalis*, as represented in ample col-



CHEILANTHES PYRAMIDALIS ARIZONICA MAXON

lections from widely diverse regions of Mexico and Guatemala, embraces other puzzling, closely interrelated forms. These and the present plant will be discussed subsequently, together with *C. angustifolia* H. B. K., *C. cuneata* Link. *C. chaerophylla* (Mart. & Gal.) Kunze, *C. marginata* H. B. K., and **C. membranacea**[5] in their relation to *C. intramarginalis* Hook., the type of Mildella.

EXPLANATION OF PLATE 6.—Fig. 1, sterile and fertile frond. Fig. 2, pinnule with the indusium removed, showing soriation. Fig. 3, pinnule, showing indusium. Fig. 4, scale from rootstock. Fig. 5, scale from bud. Fig. 6, sporangium.

[Owing to limited material available at the time the drawing was made, the fertile frond figured is somewhat smaller and less compound than is usual in this subspecies.—C. A. W.]

WESTERNMOST STATIONS FOR CHEILANTHES FEEI.—This species, while exceedingly common in the Mexican border region from central Texas to Arizona and widely distributed in the central and western parts of the United States, is nevertheless very rare in the states of the Pacific coast. In addition to the station at Almota, southeastern Washington (*Piper*) and the recent record from the Providence Mountains, San Bernardino County, California, (*Parish*),[6] only the following material is known to the writer: Mountain Spring, western border of the Colorado Desert, San Diego County, California, altitude 600 meters, May 12, 1894, *Internat. Bound. Comm.* 3080 (*Schoenfeldt*, coll.).

THE ALPINE LADY FERN.—In a recent paper upon the genus Athyrium, with particular reference to the North American forms referred or related to *A. filix-foemina*,[7] Butters has described an American variety (var. *americanum*) of the Old World *A. alpestre*, pointing out as essential characters that "it differs in having

[5] *Pellaea membranacea* Davenp. Bot. Gaz. **21**: 262. *pl. 18. f. 5, 6.* 1896.
[6] Bot. Gaz. **65**: 334. 1918.
[7] Rhodora **19**: 169–207. *pl, 123. text figs. 1–5.* 1917.

the ultimate segments of the frond conspicuously narrower and more widely separated from one another, and the sori even smaller than in the type . . ., submarginal, and protected by a reflexed tooth of the pinnule," and adding that "careful search has failed to disclose any vestige of indusium in the American material." Because of an approach which a few specimens are held to show "to the European form in the cutting of the frond," the author regards the American plant as a "geographical variety rather than a species," despite the complete suppression of indusia in all American specimens. An examination of the very ample material in the National Herbarium, however, including some of the numbers cited by Butters as intermediate in leaf cutting, reveals no specimens which are truly intermediate in this or other respects, the extremes in "leafiness" among the American specimens being no greater than may reasonably be attributed to partial sterility or to favorable or adverse conditions of habitat. The American material is essentially uniform in all respects save size, and since it differs constantly from the European plant it should rank as a distinct species, **Athyrium americanum.**[8] The invariable absence of reduced indusia, which might be regarded as an inconsequential point if the plants were otherwise like the European, is a substantiating character of some worth; but disregarding this feature, the plant is different enough in gross characters to warrant separation. The conspicuously narrow, oblique, widely separated segments give it a strict, singularly skeleton-like aspect widely different from that of the leafy European plant,

[8] **Athyrium americanum** (Butters) Maxon. (*Atnyrium alpestre americanum* Butters, op. cit. 204.)

No type specimen having been designated by Butters, the following collection, represented in both the Gray and National Herbaria, may be regarded as the type: Rogers Pass, British Columbia, alt. 1320 meters, Aug. 23, 1904, *E. R. Heacock* (in Shaw's "Selkirk Flora") 554.

which has the segments spreading and more broadly attached; and the oblique, elongate-deltoid pinnae (with the basal pinnules often greatly produced) are equally at variance from the spreading, oblong-acuminate pinnae of the European species. The range "Alaska and British Columbia to California and Colorado; also in Gaspé County, Quebec" must be extended to include Nevada, an especially luxuriant specimen recently received having been collected at Candle Creek, Pole County, Nevada, altitude 2570–2630 meters, August 18, 1917, by W. W. Eggleston (No. 14135).

WASHINGTON, D. C.

A Year's Collecting in the Northeastern United States

E. P. KILLIP

Between the middle of August, 1916, and the middle of August, 1917, it was my good fortune to botanize in certain very interesting fern regions in the northeastern part of the United States. These localities have been frequently visited and often described by botanists, but possibly a brief account of the places and of the ferns collected will not be without interest at this time.

CAPE MAY AND THE NEW JERSEY PINE BARRENS

During the latter part of August, 1916, M. S. Baxter and M. E. Woodams, of Rochester; Joseph G. Taylor, of the Department of Biology, New York University; and myself, made a trip to the Cape May peninsula, the southern extremity of the State of New Jersey, and to Hammonton, in the heart of the pine barrens. Although the many species of grasses, sedges, and flowering plants to be found in these regions made the bulk